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SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE



Slow Motion

See Page 213

A SCIENCE SERVICE PUBLICATION

What General Electric people are doing . . .

BRAINY PUNCH PRESS

The increasing need for electronic equipment of all kinds in today's economic system has made it necessary to focus more and more attention on the problem of finding manufacturing equipment and techniques for making such electronic equipment automatically. But, while much effort has been applied to the automatic production of such equipment in quantities in the hundreds or thousands, very little has been done to increase the productivity of the job shops which turn out such equipment in small quantities—lots of from 10 to 50. Any improvements in this field would make their greatest contribution in improved automation of the small-quantity production typical of many military products and specialized commercial lines, such as radio and television transmitters and studio equipment, and microwave communication equipment.

Engineers in our Electronics Laboratory at Syracuse have been working on this problem for the Signal Corps, which wants to develop a system of automatic machinery to assemble and test electronic circuit sub-assemblies for various types of military electronic equipment. One of the results of this work is an automatic punchpress with an electronic "brain," which may well be another step toward the automatic factory of the future.

Directions are fed to the new punchpress by an electronic digital computer. The computer "reads" a perforated card for information on size, number, and location of holes to be punched. The press automatically positions the material to be perforated and performs its punching operations within an accuracy of a few thousandths of an inch. The techniques involved could well be applied to other industrial operations such as drilling, riveting, stapling, electrical testing, etc. The sub-assembly being produced can be changed simply by punching new directions on a new program card, with no time lost for retooling or training operators.

X-RAY MICROSCOPE

For many years laboratories both in this country and abroad have tried to develop an X-ray microscope that could be produced in quantity. Our General Engineering Laboratory at Schenectady has now succeeded in developing such a device, capable of wide use in medical science, biology, and industry.

The new instrument, magnifying up to 1500 diameters, is expected to aid in the development of new alloys and in studies of such things as corrosion and welding of metals; to help researchers learn more about tooth decay, diseases of the bones, and other such human ailments as mineral deficiencies and hardening of the arteries; to assist in the study of such things as the covering or bonding quality of paints, adhesives and finishes; and in some cases to provide a speedy substitute for chemical analysis.

In the new microscope the X-ray source is only one 100,000th of an inch. This tiny size is achieved by focusing the electrons through two electrostatic lenses, which are essentially doughnut-shaped metal rings to which voltage is applied. The magnified X-ray image thus obtained can be seen by the eye or photographed for permanent record. While the idea of the electrostatic lenses was not new, our laboratory's contribution lay in finding a practical way to use them. The instrument provides great stability for the longer exposures needed for high-quality pictures, and it is the first to use a built-in camera that provides developed photographs immediately after a subject is exposed. It is not affected by magnetic materials and therefore can be used in the study of steel and alloys.

Our X-ray Department in Milwaukee will take over production of the device, after further refinements in design at Schenectady.

CLEANER ALLOYS

One of the important facets of the modern industrial picture is the significant part which is played by metallic alloys. And the prospects for the future indicate that this part can become even more significant as better alloys are developed.

A stumbling block in the path of this progress has been mechanical impurities which find their way into the alloys during the melting process. The major source of such impurities is the atmosphere, which forms oxides and nitrides with the various alloying elements. The result is a distinct weakening of mechanical properties in fabricated products, and this weakening is accentuated in the case of high-temperature alloys, in which the materials produced are subjected to extremes of stress and temperature.

Our Research Laboratory has been studying these effects and their causes for several years. It found that cleaner alloys could be produced in large-size induction furnaces at high vacuum. As a result, American engineers can now expect to have some of the "impossible" alloys and other metallurgical materials they need to accomplish dream-world feats.

Such vacuum-melted, high-temperature alloys are now being produced by our Carbonyl Department in Detroit, for use in turbine-wheel buckets of jet engines and other applications. Heading the list is a new alloy capable of withstanding higher temperatures than any wrought alloy now in production. This new alloy has stress-rupture properties superior to those exhibited by conventional wrought turbine bucket alloys such as M-252 and S-816.

Progress Is Our Most Important Product

GENERAL  ELECTRIC

METEOROLOGY

Predict Hurricane Paths?

Giant electronic "brains" may be used next season to help meteorologists forecast the paths of hurricanes. Predicting formation will follow later.

► BY NEXT year's hurricane season, giant electronic "brains" may have been put to work to help weathermen predict paths of these tropical storms.

The electronic computers probably will not track the hurricane itself because, tremendous as the energies involved are, the tropical storms are nevertheless relatively small-scale atmospheric disturbances. Particularly in their early stages, hurricanes are too small to be handled on the electronic computers under the present systems.

When weathermen learn how to predict large-scale atmospheric motions on the giant "brains," however, then they will also have solved the problem of forecasting hurricane paths.

"Electronic computers," Jerome Namias of the U.S. Weather Bureau told SCIENCE SERVICE, "may be able to bring out the broad pattern in which the hurricane is embedded."

If this can be done, he predicted, plotting the hurricane's path would be "solved."

The movements of hurricanes and other storms, Mr. Namias pointed out, seems to be governed by the wide band of wind meteorologists know as the "planetary wave" because it circles the earth. This globe-girdling band has a very long, stretched out wave motion such that there are usually only three to five crests and troughs all the way around the world.

It is the positions of these crests and troughs, Mr. Namias said, that determine the paths of violent storms on the surface. The 30-day weather forecast for September, as all the long-range outlook maps do, showed the most likely path of cyclonic disturbances, which include hurricanes.

Both Edna and Carol followed the expected path closely. This does not mean that meteorologists can now predict the occurrence of hurricanes or their paths a month in advance, Mr. Namias cautioned. His weather maps show predictions for temperatures, precipitation and pressures for most of the Northern Hemisphere.

The regions over which high and low pressure areas are found are determined, Mr. Namias explained, by the positions of crests and troughs in the planetary wave.

The pattern for September, he said, "was such as to make tropical disturbances come closer than usual to the East Coast and to occur with fair frequency."

Predicting a hurricane's path with electronic computers would possibly work like this: First, the general overall circulation, assuming that the hurricane had no influence on the large-scale air flow, would be forecast. Then the meteorologists would, by means of mathematical formulas represent-

ing the tropical disturbance, try to find where the hurricane was headed.

This process can be likened to throwing a stick on a river, then watching how fast and where it floats, and when and where it hits the river bank.

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PEDIATRICS

Cut Oxygen for Babies To Prevent Blindness

► TO SAVE their eyesight, premature babies should get oxygen only when absolutely necessary for survival. The routine use of it should be abandoned.

This is the recommendation of 75 physicians—baby doctors and eye-specialists—in 18 hospitals around the nation.

Their recommendation, based on their controlled studies, was reported by Dr. V. Everett Kinsey of the Kresge Eye Institute, Detroit, at a symposium on retrolental

fibroplasia, or R.L.F., held by the American Academy of Ophthalmology and Otolaryngology in New York.

R.L.F., unknown a few years ago, is now the leading cause of blindness in children. Giving oxygen, even for a short time, during the first week of life is "intimately associated" with the disease, although it cannot be called the cause, Dr. Kinsey said.

Use of oxygen for premature babies in hospitals throughout the United States became routine as a means of helping the tiny infants survive. In advising that it be abandoned, the group reported finding no significant difference in mortality with the routine use of oxygen and with curtailed use of it.

However, among babies getting routine oxygen, 72% developed R.L.F. in some one of five active stages, compared to 30% in the group on curtailed oxygen. For the most severe stage of the disease, with permanent damage to the eye, the difference was even greater. This stage developed in 25% of the babies on routine oxygen, compared to only six percent of babies given oxygen only when absolutely necessary.

The results are for the first six months of the study, supported by the National Institute of Neurological Diseases and Blindness of the Public Health Service, the National Foundation for Eye Research and the National Society for the Prevention of Blindness.

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AFRICAN BIRDS—Prof. John T. Emlen of the University of Wisconsin is shown with part of the collection of bird specimens he brought back from southern Africa for exhibition by the zoology department. He is holding two African birds that closely resemble the American redwing blackbird and the meadow lark. In each hand, the African bird is on the left, and its American counterpart on the right. Neither the red-shouldered Wydah nor the yellow-throated long-claw is related to the American species which they resemble in appearance, behavior and type of habitat they occupy.

PHYSICS

Cosmic Rays Filtered

► SOME OF the most powerful cosmic rays smashing into the earth from outer space are being subjected to close scientific scrutiny by means of two ingenious "filters" built at the University of California.

These super cosmic rays, in the energy range of 10,000,000,000 to 200,000,000,000 electron volts, are considerably more powerful than any that can now be generated in atom smashers. Particle accelerators now planned will speed particles into the lower part this range.

Studies of very powerful rays have been difficult because they are obscured in the constant rain of less powerful cosmic radiation.

The Berkeley devices, called "momentum analyzers," were built to filter out the less energetic radiation, so that scientists can look at the heavier cosmic projectiles.

The instruments, built under the direction of Dr. Robert B. Brode, professor of physics, are about 15 feet tall. About half way down the analyzer, cosmic rays encounter a powerful magnetic field. The magnet literally whirls all the cosmic rays under 10,000,000,000 electron volts right out of the instrument. Thus, below the magnet, the scientists detect only cosmic rays from 10,000,000,000 to 200,000,000,000 electron volts.

Scientists used to try to "filter" out low energy cosmic rays by going underground into mines. This did filter the low-energy particles, but the high-energy particles were slowed down so much they look like ordinary low-energy cosmic rays.

Dr. Brode and his colleagues hope the instruments will help them learn more about the number of very fast particles that reach the earth. They also want to learn the ratio of positive-to-negative high-energy particles in cosmic rays, and how these radiations interact with matter.

An ultimate object is to learn more about how mesons, fleeting particles found in cosmic rays and also generated in big atom smashers, seem to hold the nucleus of the atom together.

The new instruments will not put atom smashers out of business. In the energy ranges they can cover—up to 6,000,000,000 electron volts now and up to 25,000,000,000 electron volts when new machines are completed—the atom smashers can reveal more in minutes than the trappers of natural cosmic rays can learn in months.

Above the range of the atom smashers, however, scientists must look to instruments for answers to their questions about powerful cosmic rays.

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MEDICINE

Eugenics For Diabetics

► INSULIN, BOON to the diabetic, may be good medicine but it is bad eugenics. With its aid, diabetics are saved to breed more diabetics. And many of the children of diabetic mothers are born deformed in one way or another.

This eugenic challenge to diabetes specialists comes from Dr. Alan F. Gutt-macher, director of obstetrics and gynecology at Mount Sinai Hospital, New York.

Modern medicine, he says, is doing all within its power to thwart nature who, through still births, abortions and malformations, "seems to be crying: Don't let the diabetic woman reproduce herself."

He charges himself with being "among the most guilty" in this thwarting of "nature's intelligent genetic viewpoint."

Even with insulin and modern medical care, the diabetic woman when she becomes pregnant has less than a 65% chance of bearing a surviving child, compared to the non-diabetic who has about an 86% chance. Malformations are about three times as frequent for the offspring of the diabetic woman as for normal women, Dr. Gutt-macher says in *Eugenics Quarterly* (Sept.).

Before 1922, when insulin was discovered, patients with diabetes rarely became pregnant and, when they did, neither mother nor child survived in half the cases. Since

then diabetic parents have multiplied many fold and potential diabetic offspring to an even greater number.

The modern doctor asked to advise a diabetic about having children is faced with the difficult decision between the rights and happiness of the individual and the ultimate welfare of the community, Dr. Gutt-macher declares.

Diabetic women have the "same insatiable urge for motherhood as the normal woman" and being unable to have children or being advised against it leaves her with the same frustration as any other woman.

Her plight is made worse by the attitude of adoption agencies which prefer to place children in the homes of physically normal persons who have a full life expectancy.

Dr. Gutt-macher says that as an obstetrician he can state the problem, but must leave its solution to the geneticist.

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NATURAL RESOURCES

U. S. Oil Shale Deposits Beat World Oil Reserves

► OIL SHALE deposits of Colorado, Utah and Wyoming are one of the world's major fuel sources, containing more than 100,

000,000 barrels of oil, comparable to the world's known resources of petroleum.

Clyde Berg of Union Oil Co. of California presented this estimate of the energy resources of the mahogany-colored Green river oil shale formation at the American Institute of Chemical Engineers meeting in Glenwood Springs, Colo.

Important technical advances have been made during the past five years, "including hydrogenation of shale oil over the cobalt-molybdate catalyst and application of the new hyperperforming process for the production of premium motor fuel," Mr. Berg reported.

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AGRICULTURE

Banana Stem Rot Can Be Prevented

► **STEM ROT** in bananas during shipment can be prevented by a chemical that is safe to paint on the stems after bunches are cut from the stalk.

Scientists at the B. F. Goodrich Research Center, Cleveland, have developed a fungicidal paint containing polyethylene polysulfide, or p.e.p.s., which prevents banana stem rot.

For some time growers have been using the material to paint a rubbery film on the ends of whole stalks of bananas after cutting from the tree. The growers, however, were reluctant to apply the chemical to the stems of freshly cut bunches, fearing that the fungicide would migrate into the edible portion of the fruit.

To prove that such a practice would not harm the fruit, radioisotope tracers were used to detect possible movement of the chemical through the fruit.

A quantity of the p.e.p.s. was especially prepared from radioactive sulfur, then applied to the freshly cut stems of bananas. A Geiger counter held close to the coated stems indicated their great radioactivity.

The bananas were allowed to ripen. The coated stems still showed the high radioactivity, but the edible portion of the fruit showed none. In fact, a slice cut only one-sixteenth of an inch away from the coated stem was free from radioactivity, proving that the fungicide chemical does not migrate from the point of application. Therefore, it can be safely painted on the stems prior to shipment.

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AERONAUTICS

2.5-Ton Propeller Plane "Hovers" Over Airport**See Front Cover**

► **SPECTATORS AT** the Oxnard, Calif., airport were startled recently to see a propeller-driven plane of two and a half tons "hovering" overhead. It was going only 11 miles an hour, but by all rights it should have been going much faster—or crashing.

The plane was the Custer Channel Wing-5. Its wings resemble half-barrels. Two pusher-propeller engines are mounted in these half-barrels. In a demonstration, the plane climbed 3,000 feet a minute after using less than 200 feet of runway space.

Its inventor, Willard R. Custer, believes the craft presages "a new era in aviation history." The slow-motion plane can do 180 miles an hour when not otherwise showing off. It can develop as much lift per horsepower at 11 miles per hour as commercial airliners develop at regular flying speeds. The plane is shown on the cover of this week's *SCIENCE NEWS LETTER*.

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GEIGER CHECK—To prove that a new fungicidal formulation developed to arrest stem rot in bananas does not migrate into the edible portions of the fruit, Dr. John C. McCool, research chemist at the B. F. Goodrich Research Center, uses radioactive tracers.

OPHTHALMOLOGY

Check Leprosy Blindness

► **SPREAD OF** leprosy to the eyes, formerly a major cause of blindness, can now be checked by the sulfone drugs that are beginning to conquer the ancient plague itself, Dr. William J. Holmes of Honolulu reported at the International Congress of Ophthalmology meeting in New York.

The sulfone drugs, first introduced in 1941, are promin, promizole, diasone, sulfetrone and diaminophenyl sulfone.

Leprosy spreads to the eye mainly by way of the blood, Dr. Holmes explained, though the germ may be transferred from spots on the face. It may cause loss of the eyebrows and of the lashes, with numerous deformities of the lids. Squint due to dim vision in one eye is frequently seen.

Acute infection by other germs that invade the diseased tissues around the eyes is common, but can be routed by antibiotics, he said. The hormones, ACTH and cortisone, are effective in the treatment of nodules that form in the sclera, the "tunic" that covers the back part of the eyeball.

The cornea is the most vulnerable of all the structures of the eye affected by the bacillus of leprosy, Dr. Holmes said. Radiation, vitamins and the adrenal hormone preparations are all useful in efforts to minimize the serious effects on the cornea, and transplantation of cornea has been tried, though with little success.

Cataracts may develop as a result of the repeated infection, he said, but most patients

tolerate operations for cataract surprisingly well. Apparently the bacillus of leprosy does not penetrate to the back part of the eyeball, so far as reports now show.

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MEDICINE

Cortisone May Lower Defense Against Cancer

► **CORTISONE**, ADRENAL gland hormone famous for its relief of pain and crippling in arthritis, "probably" lowers the defense of the body against infection and new growths, such as cancer.

Studies showing how this happens are reported by Drs. T. Nicol and R. S. Snell of King's College in *Nature* (Sept. 18).

Their studies were made on guinea pigs. In these animals, they found that cortisone depressed the activity of the blood cell forming reticulo-endothelial system, particularly the spleen. This system has previously been reported to be an important defense mechanism of the body against growth of tumors, including cancers.

Study of cortisone's effect on this system was made because of reports that patients being treated with cortisone are more susceptible to infection and that cortisone enhances the spread of transplanted tumors in animals.

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OPTICS

Seeing Violet Light

► THE VIOLET light that is often noticed to pervade the early moments of twilight may be explained by a new discovery about the human eye reported in *Science* (Sept. 10) by Drs. Edgar Auerbach and George Wald of the Biological Laboratories, Harvard University.

Among the cones of the eye, they found, are some that are particularly sensitive to violet light. The cones are the cells located predominantly in the center of the retina that are responsible for bright daylight vision.

When you step from a brightly lighted room into the darkness, your eyes gradually become accustomed to the dark. During the first few minutes, your eyes rapidly become more sensitive until your vision reaches a plateau. This is due to the adaptation of the cones of your eyes.

Later, there comes another even more striking increase in visual sensitivity due to the adaptation of the eye's rods. The rods are the cells responsible for night vision. In general, the cones are especially sensitive to yellow, orange and red light; the rods see best in the violet end of the spectrum.

However, after adaptation to orange light, the Harvard scientists found, something very different occurs. At first, the cones of the eyes are more sensitive to violet light than to orange. After about two minutes in the dim light, a change takes place and the eye then becomes more sensitive to orange than it is to violet. This is the reverse of what scientists call the Purkinje shift.

After about 15 minutes of dark adaptation, the rods take over the task of vision. Then comes a true Purkinje shift and the eyes are again more sensitive to violet.

Study of the special sensitivity of the cones to violet light during the first two or three minutes of dark adaptation was stressed by the Harvard scientists. They exposed their subjects repeatedly to intense orange-to-red light and then measured their sensitivity to light of various wavelengths from 405 millimicrons to 546 millimicrons.

After one minute of adaptation, they found, the eye is most sensitive to violet light, but there is another wavelength to which it is more sensitive than to others; that is at about 555 millimicrons, which is yellow light. After ten minutes of dark adaptation, the yellow light alone is seen best.

In another experiment, the investigators measured the sensitivity to light of various wavelengths in a period of dark adaptation after exposure to orange-to-red light or to blue light.

The red light, they found, spared the cone receptors sensitive to violet. After one minute of dark adaptation, the eyes were especially sensitive to violet light and also slightly less sensitive to orange-red light.

After exposure to the blue light that

dulled the sensitivity of the violet receptors, the sensitivity after one minute of dark adaptation showed only a single peak for the orange-red light.

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MEDICINE

Earnings Increased For Polio Patients

► EARNINGS OF a group of poliomyelitis patients was increased more than ten times through rehabilitation, Dr. Chester S. Keefer of Washington reported at the Third International Poliomyelitis Conference in Rome.

Dr. Keefer is special assistant to the secretary for health and medical affairs in the U. S. Department of Health, Education and Welfare.

Annual earnings of the group of 3,801 polio patients before the rehabilitation was estimated at \$728,000, Dr. Keefer reported. Of the group, 85% were unemployed, 31% had never worked, 69% were dependent on their families and six percent were on public welfare rolls at the start of the program.

The following year, their earnings totaled \$7,400,000.

Dr. Keefer cited these figures to show that rehabilitation, although long and costly, pays off in dollars and cents as well as in happiness for the individual.

Keeping the public informed about the disease and everything known that can be done to control it is "essential," Dr. Keefer declared, if the total problem of poliomyelitis is to be solved.

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BIOLOGY

Spadefoot Toad Breeds Only During Hurricanes

► ALTHOUGH HURRICANE warnings send people in Florida scurrying for cover, at least one group of state residents looks forward to a good heavy storm.

The spadefoot toad, known scientifically as *Scaphiopus holbrookii*, is the strange little animal that needs the death-causing hurricanes to bring new life to its species, for it can only breed during heavy storms.

Scientists are still baffled as to what the triggering mechanism is that tells these toads when a storm is approaching or is upon them. Some speculate that the toads have a pressure-sensing device, and others believe that they come to the surface of the ground only after their holes have become filled with water.

So adapted are the young to this way of birth that the tadpoles will not survive in an ordinary pond, but will only live in a storm puddle. As the puddle dries, the tadpoles are also equipped to speed up their development into adulthood.

This particular toad has some cousins in the desert that apply this storm-breeding technique to take advantage of flash floods.

Since Florida has escaped a heavy storm or a hurricane so far this year, the spadefoot tadpole has not made its annual appearance.

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ORNITHOLOGY

Always Spring for Birds in Tropics

► HOW DO birds in the tropics, where there are no seasons, know when it is time to find a mate?

In temperate zones, the problem is solved by the seasons: all members of a bird species nest at the same time, and then rest the rest of the year. Where it is forever summer, birds get no guidance from the weather.

Some answers to the dilemma of the tropic bird have been found by Dr. Alden H. Miller, professor of zoology at the University of California and president of the American Ornithologists' Union.

Dr. Miller revealed his findings, made on a trip to the Magdalena River Basin in Colombia, South America, at a meeting of the union in Madison, Wis.

The tropic birds, he said, just nest all the year round. The breeding cycle appears to be determined by the time each individual hatches. When the bird becomes of age no matter what time of the year, he finds a mate. Then he rests for an appropriate period before breeding again.

So in the tropics individuals of a single species may be found nesting at any time of the year, while others of the same species are resting instead.

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"TORCH" SWEATER — Testing a sweater for its flammability is Janet Rountree, 17, of Evanston, Ill., a 1954 Science Talent Search winner who worked this summer at the National Bureau of Standards.



SUMMER WORK FOR SEARCH WINNER—Everett C. Dade, 17, of Dover, N. H., a top winner in the 1954 Science Talent Search (see SNL, March 13, 1954), spent this summer at the National Bureau of Standards programming problems for the electronic computer.

GENERAL SCIENCE

Talent Search Under Way

► A NATIONWIDE search is now under way to find the 40 most promising science-minded high school seniors in the country.

The Fourteenth Annual Science Talent Search was launched with an invitation to seniors in 27,000 public, private and parochial schools throughout the land. They will have the opportunity to compete for \$11,000 in Westinghouse Science Scholarships and a five-day visit to Washington. Valuable honorable mention status will go to 260 others.

The results of the search will reveal who among this year's seniors will be the nation's leading scientists of the future, and will stimulate others to undertake scientific training.

The Science Talent Search is conducted by SCIENCE SERVICE and supported by the Westinghouse Educational Foundation. Watson Davis, director of SCIENCE SERVICE, in announcing this year's Search, called attention to the growing shortage of scientists and engineers, a shortage that hampers the nation's industrial and defense programs.

"Creative scientists and technologists so urgently needed by our civilization are being found and nurtured by the National Science Talent Search," Mr. Davis said. "The success of those who have won previous honors shows that this method of selection works with effectiveness."

"Colleges are justified in the weight they give National Science Talent Search ratings when they give scholarships and grant admissions," Mr. Davis said.

Principals and science teachers in secondary schools throughout the country are now

receiving instructions on "How You Can Search for Science Talent." They will learn how to recognize science talent among their students.

All entries for the Search must reach the Washington office of Science Clubs by midnight, Monday, Dec. 27. Winners and honorable mentions will be announced late in January, 1955, and the 40 winners will come to Washington Feb. 24-28, 1955.

For complete details of the national and state Science Talent Searches write to Science Clubs of America, 1719 N St., N.W., Washington 6, D. C.

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OPHTHALMOLOGY

Cataracts Caused by Allergy to Penicillin

► AN ALLERGIC reaction to penicillin, famous mold remedy for germ infections, has caused cataracts in a 39-year-old man, Dr. Ruby K. Daniel of Dallas, Tex., reported at the International Congress of Ophthalmology meeting in New York.

The patient took penicillin for an ear infection. This brought on a severe and incapacitating skin trouble which lasted two months. The cataracts seemed to have followed. The patient insisted that his eyesight was normal until he had the skin trouble.

The case is the latest of a number of allergy-caused cataracts in young people which Dr. Daniel has seen. Not all were due to penicillin allergy.

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AERONAUTICS

Helicopter Booster May Save Lives

► A LIGHTWEIGHT power booster for helicopters could spell life or death for wounded Marines awaiting rescue from mountain clearings.

Although the whole system weighs only 67 pounds, including its fuel tank perched atop the helicopter's rotor, it permits a Marine Corps HRS-2 helicopter to lift six men per load from a 5,000-foot hilltop clearing. Because of the thinner air, the machine ordinarily could evacuate only three wounded at this altitude.

Used momentarily for extra take-off power, the booster consists of three small rockets attached to the three blades of the HRS-2. The rockets burn hydrogen peroxide.

The power booster helps the loaded machine climb into the sky. After forward speed has been attained, the main piston-type engine easily keeps the machine aloft.

To gain the same extra take-off lift without rockets, the helicopter's engine would have to be increased about 200 pounds and its power-transmission gears strengthened.

Although designed to "fit" Marine HRS-2 'copters, it can be adapted to any helicopter, its manufacturers, Reaction Motors, Inc., say.

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PEDIATRICS

High Altitude Babies Lightweights at Birth

► BABIES BORN at the high altitude of 10,000 feet at Leadville, Colo., and surrounding Lake County are lightweights. They average three-quarters of a pound less at birth than babies born in Denver, which is at half that height.

This puts many of these babies technically in the premature class since doctors classify babies as premature if they weigh five and one-half pounds or less at birth.

The Lake County lightweight babies, however, are not otherwise abnormal and seem to be as healthy as full-weight babies. Mothers of these lightweight babies do not eat any differently and their general social and economic status does not seem any different from mothers of so-called normal weight babies. There does not seem to be any racial difference, either.

About the only factor that can account for the babies being born lightweights seems to be the lower oxygen supply at the high altitude of Lake County. Scientists of the University of Colorado School of Medicine will make a two-year study of this factor at St. Vincent's Hospital, Leadville, with the aid of a \$10,000 grant from Playtex Park Research Institute of Dover, Del.

The findings are expected to be important for small, technically premature babies everywhere.

Science News Letter, October 2, 1954

GENERAL SCIENCE

U. S. Grants Visa to Nobel Physicist Dirac

► PROF. P. A. M. DIRAC, England's famed 1933 Nobel prize winner in physics, has been granted a visa to visit the United States, SCIENCE SERVICE has learned.

Last May, Prof. Dirac's application for entry to this country to spend the academic year at the Institute for Advanced Study, Princeton, N. J., was denied, although he had previously visited the Institute in 1934-35, 1946-47, 1947-48 and 1949. (See SNL, June 5, p. 357.)

Dr. J. Robert Oppenheimer is director of the Institute.

A re-hearing has now been held on Prof. Dirac's visa application and permission granted by the State Department for the top-flight physicist to enter the U.S. He is expected to arrive at the Institute next April, a university official said. Prof. Dirac will also visit Canada, Japan and India on his trip.

He holds the highly prized chair of Lucasian Professor of Mathematics at Cambridge University, England, to which he was appointed in 1932.

Another physicist who has had difficulties entering the United States, but who has now been granted special permission to visit this country, is the atomic scientist Dr. M. L. E. Oliphant, professor of physics at Australia's National University, Canberra.

Dr. Oliphant has since canceled his proposed trip, and is not expected to take advantage of his transit permit.

In 1951, administrative delays in passing on his visa application prevented Dr. Oliphant from attending an international conference of nuclear scientists in Chicago.

At least 50 foreign scientists, including Nobel prize winners in fields other than physics, have been refused visas in the last two years. (See SNL, July 10, p. 24.)

Science News Letter, October 2, 1954

PATHOLOGY

Safer Shots in Arm, Thanks to Dishwasher

► SHOTS IN the arm, whether of a vaccine, penicillin or some other remedy given by hypodermic injection, can be safer to get and easier to give in the future, thanks to a laboratory dishwasher at the Army's biological warfare center at Camp Detrick, Md.

One danger of such injections is that the injecting needle has not been thoroughly sterilized between injections and could, therefore, carry disease germs from one person to another. Among the germs believed transmitted in this way is the virus of viral, or serum, hepatitis.

To be really safe, such needles should be autoclaved, that is, sterilized under steam pressure, not just boiled.

However, the nuisance of taking a batch of needles from the sterilizer, wrapping

them in gauze and putting them each in a small glass tube and then re-autoclaving them was what started the Detrick dishwasher on his invention.

The invention itself consists of a steel disk with dozens of small holes into each of which a hypodermic needle fits. Covering this is another disk with only three holes. These holes each have a small cap. By removing the cap and turning the top disk, the hole comes over the hole holding a needle. The hypodermic syringe is stuck into the needle and the needle removed. The covering disk is then moved on to the next needle as one is wanted.

The device saves time and trouble not only for the dishwasher but also for a scientist or doctor making many injections, one after the other, as in the case of mass vaccinations. Since the whole device with its needles must be autoclaved, it gets around the danger of boiled-only needles. The device was shown at the International Congress of Pathology in Washington.

Science News Letter, October 2, 1954

ENTOMOLOGY

Scientists Identify Newest Cotton Pest

► ENTOMOLOGISTS HAVE identified the newest pest to attack Texas cotton.

Dr. Paul W. Oman, entomologist at the United States Department of Agriculture Plant Industry Station, Beltsville, Md., has determined that the pest, known locally in Texas as the brown cotton leafworm, is *Acontia dacia* Druce.

Responsible for damage to 5,000 acres, this is the first year that the insect has attacked Texas cotton. Dr. Oman believes that the insect has probably been a part of normal insect life in Texas, but fed on plants other than cotton heretofore.

An unusual amount of dry weather is believed to have caused the insect to switch its diet. The moth lays its eggs on the cotton leaves. When hatched, the larvae or brown cotton leafworms, cause considerable ragging of the leaves.

Damage first appears as small buckshot-sized holes in the leaves. The holes become larger as the worms continue to feed. If unchecked, plants may be completely stripped.

Reddish-brown in color, the larva crawls along the leaf with a looping motion. When it is full-grown, it is about one and one-quarter inches long and has a black spot on each side with an irregular pale yellow line running from the black spot to the end of the body.

The insects attacked large areas of cotton plants in eastern, coastal and south-central Texas, and the parent moths have been tentatively identified in Louisiana.

Field tests indicated that parathion in quarter-pound-per-acre lots and endrin in one-third-pound-per-acre lots have proved effective insecticides. Chlorinated hydrocarbons, effective with most other cotton pests, were ineffective during field tests.

Science News Letter, October 2, 1954

IN SCIENCE

METEOROLOGY

Human Activities Cause Ice-Fog in Alaska

► HUMAN ACTIVITIES near airfields in the subzero temperatures of the far north can cause "ice-fog," which seriously reduces visibility over large areas.

Only very small amounts of water are needed to saturate air at very low temperatures, and the vapor added to the air by various human activities is sufficient to make the ice-fog, weathermen attending the American Meteorological Society meeting in Columbus, Ohio, were told.

Drs. E. Robinson, C. Steffens, W. C. Thuman and E. J. Wiggins of Stanford Research Institute, Stanford, Calif., reported results of their studies at Eielson Air Force Base near Fairbanks, Alaska.

The cutting down of visibility by ice-fog is due principally to small, nearly spherical ice particles, called "droxtals," they found. These are believed to result from rapid freezing of supercooled water droplets.

Larger, well-developed ice crystals may also be present in small numbers, but their studies showed that these caused little reduction in visibility.

Science News Letter, October 2, 1954

PHYSIOLOGY

Exercise, Wheat Germ Oil for Middle Aged Men

► ATHLETES AND middle aged men show better heart action, physical performance, and heart and blood vessel condition when on regular doses of wheat germ oil plus regular exercise, Prof. T. K. Cureton of the University of Illinois reported to the American Physiological Society meeting in Madison.

Wheat germ oil contains vitamin E, which some years ago was reported beneficial for the heart. Later, that idea was discarded as unsound.

By itself, without exercise, the wheat germ oil produces no measurable benefits, Prof. Cureton reported. His findings were made with four test groups of men. Two groups received capsules containing the wheat germ oil and two groups received similar capsules containing an inert substance.

One of each of the groups followed a training program including calisthenics and swimming three to five times a week. The men in training who received the oil showed significantly better performances and condition than those not receiving it. Of the groups not training, neither showed any improvement.

Science News Letter, October 2, 1954

THE FIELDS

OPHTHALMOLOGY

Eyestrain From Stress Of Modern Living

► THE TENSION and strain of modern living is to blame for eyestrain in large numbers of persons who have healthy eyes, Dr. Neil L. Murray of Pretoria, South Africa, charged in a report to the International Congress of Ophthalmology meeting in New York.

He mentioned specifically, among other things, the following: the wide availability of books, periodicals and daily newspapers to an extent undreamed of a century or two ago; the conglomeration of machines and instruments requiring close observation (and fatiguing bad posture) in daily duty; the flicker of cinema, television and radar screens; the fast-moving vehicles and aircraft requiring visual attention for their control; the almost universal provision of electric light, available at the flick of a switch, which has turned night into day and imposed longer hours of work on human eyes and constitutions that have not been fully prepared for it.

Wearing eyeglasses does not help relieve eyestrain, Dr. Murray stated, if the coordination power of the eyes is not strong enough to meet the demands of their occupations. The poor power of convergence, however, can be improved by treatment using prisms.

Science News Letter, October 2, 1954

GENETICS

Special Rights Urged for Twins

► SPECIAL PRIVILEGES for twins, such as resorts, clubs and libraries reserved for twins only, may help researchers understand all of mankind.

This is one recommendation for a world-wide twin study made by Dr. Luigi Gedda, director of the G. Mendel Institute in Rome, at the World Population Conference in Rome.

Twins offer scientists a better opportunity to study human traits by subjecting one twin to changes and using the other twin as a standard of comparison. Often this happened in the course of their lives.

The Italian geneticist said that society, to better understand itself, should give special favors for twins. He advocated the establishment of sea and mountain resorts, social services, movies or theatrical performances with no single-born allowed to attend, as well as "twin clubs where the well-to-do help the needy, libraries etc."

He reported that "in Italy several of these social measures have been promoted, and they have been found very useful in ob-

taining the cooperation of twins in medical and psychological studies."

To implement his study of twins, Dr. Gedda outlined a complete program including:

World birth registry for twins.

Keeping of special records by hospitals, doctors, institutions and insurance companies.

Setting up of office and clinical facilities to permit standardized medical examinations of large numbers of twins.

Establishment of twin study centers at schools of education and psychology.

Science News Letter, October 2, 1954

ENGINEERING

Device "Tests" Engine On "Drawing Board"

► AN ELECTRONIC device will make it possible to test the performance of jet engines, nuclear reactors and the like while they are still on the drawing board.

The device, developed by N. E. Friedman, a University of California at Los Angeles engineer, can simulate the thermal behavior of materials under the influence of intense and rapid temperature changes.

Adapted to an electronic computer, it enables the "brain machine" to predict the performance of a proposed structure from design factors and known material properties.

The new gadget simulates thermal behavior by exhibiting a corresponding electrical behavior under the influence of the electrical current. It makes use of readily available, inexpensive elements called semiconductors, which carry current in only one direction.

With the use of the "simulator" in the computer, it will be possible to solve any problem pertaining to the thermal performance of existing or new designs. The simple principle of analogy is employed.

The device is economically important in that it can eliminate building and testing of costly models of proposed engines.

Science News Letter, October 2, 1954

CHEMISTRY

New Synthetic Rubber Stands Boiling in Oil

► A SYNTHETIC rubber, designed for use in military aircraft, can be boiled in oil and still not be hurt.

Christened Poly-FBA, its development was announced to the American Chemical Society meeting in New York by P. J. Stedry, chemist of the Minnesota Mining and Manufacturing Co., St. Paul, Minn. The new rubber is now being produced experimentally on a small-scale. Chemically, it is 1,1-dihydroperfluorobutyl polyacrylate.

Poly-FBA withstands oils, gasoline and temperatures up to 400 degrees Fahrenheit. It works well with the new non-petroleum lubricants that are used at high temperatures in jet and rocket engines.

Science News Letter, October 2, 1954

CHEMISTRY

Can Step Up Atropine's Anti-Nerve Gas Action

► A CHEMICAL that can step up the anti-nerve gas action of atropine two and one-quarter times has been discovered.

The chemical is called pentamethonium, short for pentamethylene bis-trimethyl ammonium dibromide. It is related to one of the newer drugs used for lowering very high blood pressure, hexamethonium.

Its ability to increase the life-saving effect of atropine in laboratory animals poisoned by a nerve gas type chemical, paraoxon, is reported by Drs. C. A. de Candole and M. K. McPhail of Suffield Experimental Station, Ralston, Alberta, Canada, in *Nature* (Sept. 18).

Atropine has heretofore been considered a specific antidote, and the only antidote, for nerve gases and other anti-cholinesterase chemicals such as some of the newer insecticides.

"Pentamethonium bromide significantly increases survival of fully atropinized animals—mice, rabbits and cats—poisoned with paraoxon," the Canadian scientists state.

Its good effects come through its aid to breathing. In this respect it produces better results when given with atropine than atropine alone does.

Clue to the trial in animals of pentamethonium as an auxiliary antidote to nerve gas type chemicals came from findings of other scientists that it showed competitive antagonism with acetyl choline at nerve centers. Nerve gas type chemicals, by blocking cholinesterase, allow too much acetyl choline to collect at such centers.

Science News Letter, October 2, 1954

BIOPHYSICS

Combines Sonar, Radar And TV for Diagnosis

► THE PRINCIPLES of sonar, radar and television have been combined to make a new device for detecting cancers and other tumors, cysts and goiters, the Veterans Administration has reported.

The instrument is called the "Somascope." It was devised by Dr. Douglass H. Howry, former VA resident in radiology and now an instructor in radiology at the University of Colorado Medical School.

The Somascope is an ultrasonic photographing device expected to give well-defined pictures of cancer and other diseases of the body's internal soft organs and tissues that cannot now be seen by X-ray or fluoroscope. It is intended to supplement but not replace the X-ray and fluoroscope.

The person to be somascoped is placed in a tub of water. Tissues with different consistencies reflect sound waves through water differently. The ultrasound beamed at the patient is reflected back through the water, and the echo waves are converted into electrical signals that are made to produce a picture on a TV screen.

Science News Letter, October 2, 1954

GENERAL SCIENCE

Influence of Scientists

The scientist's problem is not one of power, but of influence, an editorial in *Nature* states. His responsibility is not whether society uses knowledge gained, but how society uses it.

[Excerpt from an editorial article in *Nature* (Aug. 7).]

► THE TASK of the scientist or technologist is to place at the service of the community the resources it needs, and to show how best they can be used. He has the responsibility of warning the community of the dangers that may attend the misuse of such knowledge and the failure to use it with due safeguards.

The decision whether or not to use that knowledge in a particular way or for a specific purpose is one which he shares with the community as a whole.

In that sense, accordingly, the problem for the scientist or technologist is one not of power but of influence. His responsibility is not for the use made of the knowledge he places at the disposal of society, but to see that his influence is most effectively exercised—to see that the consequences of using or abusing that knowledge are clearly and fully understood.

Divesting himself of the power he is so often in error supposed to possess, he has to see that his fellow-citizens appreciate the implications of the power at their disposal, and to help them to make the intellectual effort required for its control and wise use.

Cannot Impose Decisions

The hydrogen bomb, in fact, involves no fresh responsibility for the scientist as such, least of all any new moral dilemma; and once these false ideas are cleared out of the mind of the scientist himself and of the society in which he lives, there will be the less risk either of an anti-scientific attitude on the part of the public or of the scientist being charged with a responsibility which he only shares with the whole community.

As the Archbishop of York said to the British Association [for the Advancement of Science] at Liverpool, men of science "have an influence over contemporary thought and action which is possessed by no other class of men. . . . They must educate their fellow-countrymen to use rightly the inventions they have given them, and must make plain the terrifying results which may follow their wrong use."

Beyond that, the scientist has no right to go. He is not entitled, on his own responsibility, to withhold knowledge from the community he serves any more than, as Dr. J. Bronowski pointed out in a recent broadcast, he is entitled to dictate to the nation about his own discoveries. He must be content to use his influence to guide his fellow-citizens to wise decisions; but he cannot impose these decisions.

In return he can ask, in a free society, that he shall himself be free to follow his own conscience and that society shall not dictate his life to him.

He is entitled to urge on society the conditions in which effective scientific work is possible and to direct attention to the consequences which may attend restraints on the freedom of scientific investigation and intercourse.

The real challenge of the hydrogen bomb to the scientist is to consider even more carefully how best scientific thought can be put at the service of the community.

Flow of Ideas Vital

If the community is to make the intellectual effort required in the shaping of its institutions to meet the requirements of an age in which technological advance has made so many of its political divisions irrational and obsolete, the man of science has a large part to play.

He has to face in the first place the problem of the effective communication of knowledge and ideas, so that the leaders of the community can reach sound decisions based on clear appreciation of all the relevant factors, and so that the community is prepared to accept whatever demands these decisions may involve.

This means much more than questions of the presentation of his own ideas and findings. It involves questions of education and of public understanding, so that the issue is seen not as one of science letting natural forces get out of hand, but of man's self-control and his use of forces able to destroy him and his works.

For the scientist to take his place in that work, freedom of communication is vital. The scientist who has worked on guided missiles or atomic weapons is, as Dr. Bronowski rightly reminded us, seldom free to speak as he would like, and this silence is a loss to the community.

Silence Forfeits Security

Security considerations may reasonably prevent the public discussion of technical details; but once such restrictions operate beyond the narrowest of such limits, they do more than impede the exchange of ideas and the advance of science and technology: they endanger national security itself.

Once the scientist comes to be silent, to experiment or inquire only along orthodox lines, science itself will atrophy and at last fail the nation in which it is thus pursued.

Without freedom for science, and by at-

tempting to silence or intimidate original and creative minds, in the end we forfeit security itself.

Here, too, the scientist has a duty to speak, and what is required of him in this perplexed and anxious world today is not that he should refrain from pursuing his investigations and from seeking to extend the boundaries of knowledge, or that he should preoccupy himself with moral issues that are the responsibility of the whole community of nations.

Role in Shaping Policy

His immediate responsibility is, rather, with the way in which he can most speedily and effectively clarify public thinking about the scientific and technical aspects of the situation, and facilitate an understanding of the far-reaching military, economic and political decisions which are now imperative.

He will be conscious that what he has to say as a scientist represents only one factor in a complex situation, and that this has to be compared with, and adjusted to, information from other fields, and evaluated with it in the formulation of policy.

But it is important that the scientist and technologist should, through their professional associations, address themselves to this question of improving the means by which the technical or scientific expert makes his contribution to the formulation of policy and the task of government generally.

The task of education to be undertaken must include that of the leaders of the community as well as of the general public.

Above all, the extent to which the influence of the scientist is brought to bear on the formation of policy or the re-shaping of institutions will depend on the willingness of the individual scientist to attempt the prosaic task of improving the channels of communication.

Much will depend upon the effectiveness and clarity with which he presents and interprets his results and ideas to the community, and the fidelity and courage with which he and his professional institutions defend the freedom of science, not simply for the advancement of science itself but also as an essential element in the preservation of a free society.

Science News Letter, October 2, 1954

AGRICULTURE

New Delaware Potato Immune to Late Blight

► DELUS, A new potato variety that is immune to late blight, the disease which caused the 1845 potato famine in Ireland, will be available for spring planting. It is especially adapted to growing conditions in Delaware.

Science News Letter, October 2, 1954

MEDICINE

New Drug Stops Hiccups

► HICCUPS CAN be stopped by one of the new so-called wonder drugs, chlorpromazine, Drs. B. Lyman Stewart and A. G. Redeker of Los Angeles have discovered.

In five of seven patients treated the hiccups were stopped, and they were partially controlled in the other two, the doctors report.

In two patients, the hiccups were so severe that they overshadowed the original disease and kept the patients in the hospital.

One of these hiccuped day and night for six days following a gall-bladder operation. The hiccups were partially controlled if he was put into a deep sleep with morphine and barbiturate sleeping medicines, but the hiccups always came back.

A single injection of chlorpromazine stopped his hiccuping and he was well enough to leave the hospital four days later.

The chlorpromazine was effective in this and other patients after many known remedies for the condition had failed. The drowsiness that often comes as a side-effect

of the drug was never serious and was even welcomed by the patients with hiccups.

Chlorpromazine was originally developed by the Phone-Poulenc-Specia Laboratory in France as an anti-nausea and anti-vomiting drug. Drs. Stewart and Redeker report good results with it for this purpose also.

Later, the side-effects of the drug, such as its sedative and blood-pressure lowering action, have led to its trial in a wide variety of conditions, including mental sickness, and to increase the effect of pain-relieving drugs so that smaller doses of these need be given.

Injection into the muscles was found by the Los Angeles doctors the most effective way of giving it though it can also be given by mouth, they state in *California Medicine* (Sept.).

Chlorpromazine is marketed in the United States by Smith, Kline and French Laboratories, Philadelphia, under the trade-name, Thorazine.

Science News Letter, October 2, 1954

ways been produced but Dr. Jaeger believes this is temporary.

Injections of alcohol into the nerve or a surgical operation in which the nerve is cut are at present standard methods of treating trigeminal neuralgia.

Science News Letter, October 2, 1954

CHEMISTRY

New Corn's Cornstarch Makes Plastic Fibers

► PLASTIC FILMS, fibers and sheets from cornstarch were forecast for the future by Dr. Ivan A. Wolff of the U. S. Department of Agriculture's Northern Utilization Research Branch, Peoria, Ill., at the American Chemical Society meeting in New York.

A special kind of cornstarch, amylose, from a new corn hybrid would be used. The usual kind of cornstarch that makes pastes, puddings and adhesives has a branched molecular structure, whereas amylose has thread-like molecular structure, useful in plastics.

The new kinds of corn hybrids contain up to 60% of film-forming amylose.

Science News Letter, October 2, 1954

PUBLIC SAFETY

Toy Space for Safety

► WHEN YOU stub your toe on Junior's toy engine or trip over Sister's toy iron and cord, you may suffer nothing more than a minor bruise and loss of temper. However, Grandma or Grandpa, less agile than you, might have had a bad fall and suffered serious injury.

About two-thirds of all fatal falls take place in and about the home, Metropolitan Life Insurance Company statisticians report. Of course, not all of these were falls over children's toys. A good many were on stairs, and some, among older people, came when the oldsters were just walking about the house.

However, a toy abandoned at the top or bottom of the stairs or in the passage between two rooms might have contributed to some of the fatal falls.

This all adds up to the fact that providing a suitable place for the children's toys is a matter of health and safety as well as good housekeeping. Low, open shelves are easy to build and inexpensive. They should be sized to hold toys of varying sizes.

The open shelves make it easy for small children to see and reach their playthings and encourage them in the habit of keeping possessions in good order.

Boxes, on the other hand, encourage slinging the toys in at the end of the day and throwing them all out on the floor at the next playtime in the search for a particular one the child wants at that moment.

Cupboards with doors that are hard to open and shut will discourage the young children.

The shelves should be conveniently located near where the children will play with their toys. For example, shelves for trucks, wagons and other toys for active play should be in the child's bedroom where their noise will be least disturbing to the family. Books and small blocks might be kept on a shelf in the living room.

Since young children usually play where their mothers are working, the kitchen also should have some toy shelves. Sister's tea set and pans, Junior's pounding board and hammer, might well be kept there.

Science News Letter, October 2, 1954

NEUROLOGY

Inject Boiling Water to Stop Severe Nerve Pain

► THE SEVERE and recurring pain of tic douloureux, or trigeminal neuralgia, can be stopped by injecting a few drops of boiling water into the nerve center from which the pain originates, Dr. Rudolph Jaeger of Jefferson Medical College reports in *Science* (Sept. 17).

The water is injected through the cheek into the nerve center in the head from which the pain originates. The relief is believed to be permanent, the nerve cells being partially or completely destroyed.

Dr. Jaeger reports success in 14 cases treated in the past year without major complication. One patient was relieved of the pain of cancer of the jaw by the method.

Paralysis of the chewing muscles has al-

BOOKS ON GEMS

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Books of the Week

For the editorial information of our readers, books received for review since last week's issue are listed. For convenient purchase of any U. S. book in print, send a remittance to cover retail price (postage will be paid) to Book Department, Science Service, 1719 N Street, N.W., Washington 6, D. C. Request free publications direct from publisher, not from Science Service.

AMERICA'S RESOURCES OF SPECIALIZED TALENT: A Current Appraisal and a Look Ahead—Dael Wolfe—Harper, Report of the Commission on Human Resources and Advanced Training, 332 p., illus., \$4.00. Assessing the present supply of trained specialists, demands, now and in the future, and the potential supply for the future.

ANIMAL CYTOLOGY AND EVOLUTION—M. J. D. White—Cambridge University Press, 2d ed., 454 p., illus., \$8.50. Discussing the bearing of nuclear or chromosomal cytology on the mechanism and processes of evolution.

ANIMAL FORM AND FUNCTION: An Introduction to College Zoology—W. R. Breneman—Ginn, 488 p., illus., \$6.00. Synthesizing the type and topical approaches to the subject into a unified, fundamental treatment.

ANNUAL REPORT OF THE BOARD OF REGENTS OF THE SMITHSONIAN INSTITUTION: Showing the Operations, Expenditures, and Condition of the Institution for the Year Ended June 30, 1953—Leonard Carmichael, Secretary—Govt. Printing Office, 481 p., illus., \$3.75. The appendix, which is the larger part of the book, contains a selection of papers covering a wide range of current scientific research.

THE ART AND TECHNIQUE OF STEREO PHOTOGRAPHY—Peter Gowland—Crown, 128 p., illus., \$2.95. Telling how to take 3-D still pictures with special stereo cameras or with your own ordinary camera.

BUSINESS OPPORTUNITIES IN ATOMIC ENERGY: Proceedings of a Meeting for Members and Guests, March 15 and 16, 1954, New York—Oliver Townsend and Edwin Wiggan, Eds.—Atomic Industrial Forum, Inc., 205 p., illus., paper, \$6.00. Describing the atomic energy materials available for industrial use, potential uses of atomic energy, Government services available, and products required.

CAREERS AND OPPORTUNITIES IN SCIENCE: A Survey of All Fields—Philip Pollack with an introduction by Harlow Shapley—Dutton, 252 p., illus., \$3.75. Inspiring young people to prepare themselves to fill the world's need for scientists and teachers of science.

DEVELOPMENTAL ANATOMY: A Textbook and Laboratory Manual of Embryology—Leslie Brainerd Arey—Saunders, 6th ed., 680 p., illus., \$9.50. In this new edition an attempt has been made to review the world literature on the subject since 1943, particularly as it affects human development.

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A DICTIONARY OF LINGUISTICS—Mario A. Pei and Frank Gaynor—Philosophical Library, 238 p., \$6.00. An alphabetical list of the names of languages from Abakan to Zyrien, and technical terms used by students of linguistics, philology and grammar.

EXPLORING OUR NATIONAL PARKS AND MONUMENTS—Devereux Butcher—Houghton Mifflin, 4th ed., 288 p., illus., \$4.50. A lavishly illustrated book by the editor of National Parks Magazine.

FLASH! Seeing the Unseen by Ultra High-Speed Photography—Harold E. Edgerton and James R. Killian Jr.—Charles T. Branford Co., 2d ed., 215 p., illus., \$6.50. Revealing the movements of a bird and a bat in flight, the deformity of a golf ball as the golfer strikes it, the successive movements of a girl skipping rope, and other secrets hidden from the slow human eye.

THE FUNDAMENTALS OF ELECTRIC LOG INTERPRETATION—M. R. J. Wyllie—Academic, 126 p., illus., \$3.60. Directed to the oil well geologist and mud engineer as well as to their juniors still in college.

GAINS FOR HANDICAPPED CHILDREN—Herbert Yahraes—Public Affairs Committee, Public Affairs Pamphlet No. 212, 28 p., illus., paper, 25 cents. To let parents and other interested persons know what can be done for the crippled or disabled child, this booklet was prepared in cooperation with the Association for the Aid of Crippled Children.

THE GIFT: Forms and Functions of Exchange in Archaic Societies—Marcel Mauss, translated by Ian Cunliffe with an introduction by E. E. Evans-Pritchard—Free Press, 130 p., \$2.50. The author points out that the exchange of gifts had a social value lost to us with the development of our modern economic system.

INVENTORIES OF APPARATUS AND MATERIALS FOR TEACHING SCIENCE: Volume III Technical Colleges, Part 4 Electrical Engineering—UNESCO (Columbia University Press), 147 p., paper, \$2.75. For the guidance of those who are building up or restoring teaching facilities for science.

MANUAL FOR LABORATORY WORK IN MAMMALIAN PHYSIOLOGY—Fred E. D'Amour and Frank R. Blood—University of Chicago Press, rev. ed., 60 experiments, illus., paper, \$4.00. Describing 60 experiments in which the rat is used exclusively as a laboratory animal, thus demonstrating the wide usefulness of this convenient animal and simplifying the problem of laboratory animal supply.

MONOMERIC ACRYLIC ESTERS—E. H. Riddle—Reinhold, 221 p., illus., \$5.00. Providing a background of information for those working with these esters on a laboratory, pilot plant or commercial scale.

PAPER CHROMATOGRAPHY—Friedrich Cramer, translated by Leighton Richards—Macmillan (St. Martin's), 2d ed., 124 p., illus., \$5.00. Introducing methods for separating substances by this new technique and giving its theoretical background.

PLANT REGULATORS IN AGRICULTURE—H. B. Tukey, Ed.—Wiley, 269 p., illus., \$5.50. Intended for the county agricultural agent and other advanced students of plant life, this book

provides not only practical advice but underlying principles.

A PRACTICAL MANUAL OF EFFECTIVE SUPERVISION—C. A. Turner—Julian Press, 296 p., illus., \$5.00. Bringing to bear modern psychology, general semantics and engineering principles.

PRACTICAL PHYSIOLOGICAL CHEMISTRY—Philip B. Hawk, Bernard L. Oser and William H. Summerson—Blakiston, 13th ed., 1439 p., illus., \$12.00. Symbol of the attempt of the authors to keep this standard text up-to-the-minute is the replacement of the traditional frontispiece showing absorption spectra of blood pigments by a chromatogram of a protein hydrolyzate.

READINGS IN GENERAL PSYCHOLOGY—Lester D. Crow and Alice Crow, Eds.—Barnes & Noble, 437 p., illus., paper, \$1.75. Bringing together for students brief selections from the writings of psychologists on a wide variety of topics in the field.

REDUCING TOOL AND TOOL SERVICE COSTS WITH A TOOL LOAN RECEIPT SYSTEM—C. A. Horst—Virginia Polytechnic Institute, Engineering Experiment Station Series No. 93, 31 p., illus., paper, 25 cents. How to keep records in industry of what tools you have, where they are kept, and who has them at the moment.

THE RISE AND FALL OF MAYA CIVILIZATION—J. Eric S. Thompson—University of Oklahoma Press, 287 p., illus., \$5.00. An archaeologist of the Carnegie Institution of Washington gives us a glimpse of daily life among the Mayas and discusses the relation of Mayan character, education and discipline to the course of their civilization.

SOVEREIGN REASON: And Other Studies in the Philosophy of Science—Ernest Nagel—Free Press, 315 p., \$5.00. A collection of 16 essays written on different occasions, but dealing with related problems having to do with the content or method of modern science.

SPEED, SPEED, SPEED: Stories of Races and Chases in Hot Rods and Jets, Trains and Planes, Submarines and Speedboats—Selected by Phyllis R. Fenner—Franklin Watts, 246 p., illus., \$3.00. A collection of fast-moving short stories dealing with the theme of speed.

THE STORY OF MY LIFE: With Her Letters and a Supplementary Account of Her Education, Including Passages From the Reports and Letters of Her Teacher, Anne Mansfield Sullivan, by John Albert Macy—Helen Keller, introduction by Ralph Barton Perry—Doubleday, 4th ed., 382 p., illus., \$3.95. This remarkable book, first published in 1902, tells the story of the development and education of a talented woman who, without either vision or hearing, learned to live and help others.

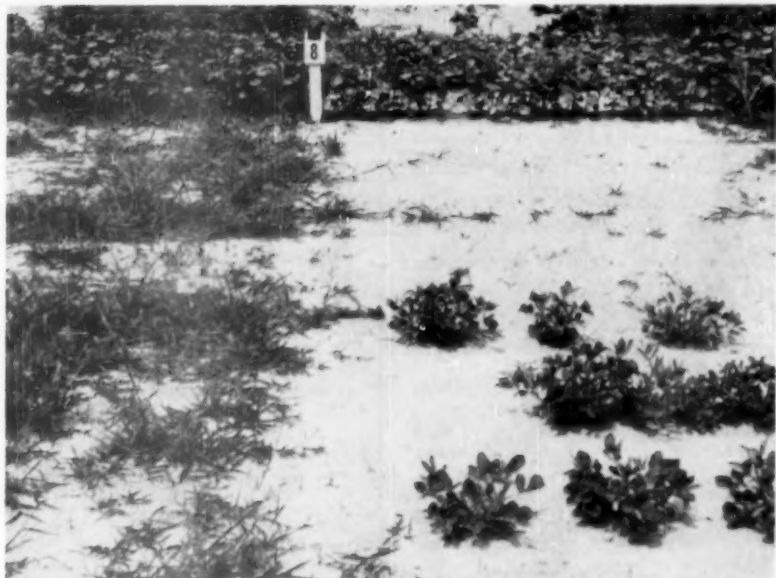
THE STRENGTHS OF CHEMICAL BONDS—T. L. Cottrell—Academic, 310 p., illus., \$5.50. An attempt to give an account of the methods and results of the experimental investigation of the strengths of chemical bonds as an introduction to anyone about to start research on this subject.

SYMPOSIUM ON PROBLEMS OF GERONTOLOGY—F. H. Bethell and others—National Vitamin Foundation, 141 p., illus., paper, \$2.50.

TO HIDDEN DEPTHS—Captain Philippe Tailiez—Dutton, 188 p., illus., \$5.00. The commander of the Undersea Research Group of the French Navy describes modern explorations under the waters of the earth. Illustrated by beautiful photographs, some in color.

WOOL: ITS CHEMISTRY AND PHYSICS—Peter Alexander and Robert F. Hudson—Reinhold, 404 p., illus., \$10.00. Intended for the use of scientists engaged on research on protein fibers and for practical workers in the wool industry. The authors are English textile chemists.

Science News Letter, October 2, 1954



CULTIVATING WEED PLOTS—Herbicide experiments conducted at the U. S. Department of Agriculture's weed investigations section, Beltsville, Md., show the effect of a pre-emergence treatment with the experimental weed killer 2-(1-chloropropyl) N-(3-chlorophenyl) carbamate at eight pounds per acre. On the left, the untreated plot shows heavy infestations of crabgrass, foxtail and other weeds. The treated plot on the right shows excellent control for 60 days with little or no injury to cotton plants.

AGRICULTURE

Weeds to Weed Weeds

► WHILE MOST persons want to get rid of weeds, the Department of Agriculture is carefully raising them.

In an effort to find new methods of weed control, the Department's weed investigations section at the Plant Industry Station, Beltsville, Md., plants, cultivates and then tries to eliminate weeds.

Dr. M. W. Parker, head of the weed investigations section, described the operation, which was set up in 1950, as an attempt to find new ways of depriving weeds of the right to compete with food, fiber, forage and ornamental crops.

Specific varieties of weed seeds are sent to the section from field collectors on request.

Often, wild weeds will make their appearance in a cultivated weed plot. Dr. Parker pointed out that there is no effort to weed out these wild cousins.

A large part of the program is the testing of herbicides, weed-killing chemicals, for effectiveness.

The station receives these chemicals from various industries, institutions and research organizations. These are then tested on a specific weed, which is harmful to certain crops.

Weeds are cultivated in flats in greenhouses along with a number of crops such as alfalfa, cotton, red clover and beans. A

new herbicide is then tested as a weed-killer, to determine whether it will eliminate such known weeds as crabgrass or pigweed, or perhaps both. If preliminary tests are favorable, the herbicide is then reapplied to a larger variety of weeds and crops in field plots.

All herbicides are tested on specific, common weeds. "We do not gamble on natural infestation," Dr. Parker explained.

Dr. Warren C. Shaw, agronomist with the weed investigations section, stated that there were three possible methods of weed control with the herbicides: pre-planting, pre-emergence and post-emergence.

When testing for pre-planting control, the herbicide is applied before the crop seeds are sown. Pre-emergence control applies to herbicides that are used after the seeds are sown, but before they begin to grow, and post-emergence control of weeds employs the herbicides after the plant has started to develop.

In a search for a new weed-killer, a herbicide is tested for all three ways of possible elimination.

In a recent test, a pre-planting herbicide, six pounds of CIPC per acre, was sprayed onto a good seed bed. Red clover was then transplanted from the greenhouse into furrows in the plot. Three weeks were al-

lowed to go by without cultivation or soil treatment. At the end of this period, it was found that the herbicide had been effective in preventing grasses and broadleaf weeds from emerging.

Drs. Parker and Shaw stated that pre-planting herbicidal control had been very effective in this instance because it protected the young seedlings. Similar herbicides have proven useful during wet weather, when cultivation is almost impossible.

Science News Letter, October 2, 1954

METEOROLOGY

Abandon Heard Island In Sub-Antarctic

► THE AUSTRALIAN weather station at Heard Island in the sub-Antarctic regions, 2,500 miles southwest of Perth, West Australia, is being abandoned.

Buildings and equipment on Heard Island will be used to expand Australia's new research station at Mawson on the Antarctic mainland. The Minister for External Affairs, R. G. Casey, said that Heard Island would be a staging camp for future Antarctic expeditions.

Australia will continue to maintain her station on Macquarie Island, 800 miles southeast of Tasmania.

Science News Letter, October 2, 1954



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Kangaroo Rat

► THE NORWAY rat has done a disservice to the rodents of the world by making himself an impudent nuisance and even sometimes a menace to health and human life. For he has brought into disrepute a host of respectable and even attractive rodents who share the name "rat."

There are, for example, the kangaroo rats. The method of locomotion distinguished by leaping great distances on the hind feet is ordinarily thought to be the province of frogs, grasshoppers and certain Australian marsupials, who carry sidecars in front for their young. But as a matter of fact, there are many animals of other families elsewhere in the world who have discovered for themselves that jumping is the best defense.

When danger threatens, the one good way to escape is simply to leave—preferably by air, as far and as fast as muscles will allow.

That is what the kangaroo rat does. Unlike his larger namesake, who goes leaping across the countryside as an everyday sport, this little animal normally sticks close to terra firma and does not jump about in hops many times his own body length. But when he doesn't like the sound or smell of his environs, he can take off like a startled grasshopper, and no dog or snake can predict where or how far he will jump.

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The kangaroo rat is like the larger kangaroo in that he uses his tail as a support, the third member of a three cornered tripod on which he sits and surveys the world. His muscular tail has a bit of window dressing, in addition. It ends in a bushy tuft of hair which flies out behind its owner whenever he jumps, like a fox-tail on a hopped-up hot rod.

There are several species of kangaroo rats in America, all of them outdoor dwellers. You have no need to fear that some day a household mouse will begin leaping about your furniture. Although there are a number of smaller jumping rodents as well as the rats, these too stick to wide-open fields and woodland. Their common name is "kangaroo mice," obviously.

To balance this borrowing of another animal's title, there are in Australia certain kangaroo-like creatures which are so small that they are usually called "mouse-kangaroos."

Where one family stops and the others start is a nice question. It can best be left to the jumping frog of Calaveras County to decide.

Science News Letter, October 2, 1954

AGRICULTURE

Worm Threatens Citrus

► A MICROSCOPIC worm that moves slowly underground is threatening the heart of the world's richest citrus producing area in central Florida.

The disease, tabbed spreading decline, is caused by a burrowing nematode, a round worm that sucks the juices of plant cells. It is already responsible for attacking an estimated 195,000 trees and the quarantining of 29 citrus tree nurseries.

Dr. H. W. Ford, assistant horticulturist at the University of Florida's Lake Alfred Citrus Station, described the spreading decline as "potentially the most serious disease problem in Florida."

The worm, which attacks trees of any age, burrows into the rootlets. At present, there are no known rootstocks which are naturally resistant to its attack.

Because the worm moves underground, and is not visible to the naked eye, the detection can only be made scientifically.

A healthy tree one day can easily show signs of infection the next. When a tree has been attacked, production begins to fall, the leaves lighten in color, the fruit becomes smaller, and the foliage becomes thinner. This does not happen overnight. It may take some time before a grower realizes that his grove has been infested.

Once a grove is infested with burrowing nematodes, it can depreciate in value from as much as \$1,500 an acre to \$350 an acre.

There is no known insecticide that will cope with the nematodes in the rootlets.

As a stop-gap control to gain additional time for research, the citrus tree experts are recommending two costly methods of combating the disease.

Questions

CHEMISTRY—How has atropine's power of saving nerve gas victims been increased? p. 217.

□ □ □

GENERAL SCIENCE—Who can enter the Science Talent Search? p. 215.

□ □ □

METEOROLOGY—In what way does human activity hamper arctic visibility? p. 216.

□ □ □

OPHTHALMOLOGY—How can blindness in leprosy be checked? p. 213.

□ □ □

PHYSICS—How can cosmic rays be filtered? p. 212.

□ □ □

Photographs: Cover, Custer Channel Wing Corp.; p. 211, University of Wisconsin; p. 213, B. F. Goodrich Chemical Co.; pp. 214 and 215, Fremont Davis; p. 221, U. S. Department of Agriculture; p. 224, Eastman Chemical Products, Inc.

One method is to build fumigant barriers, eight feet wide, around an infected tree to stop the nematode from moving on to healthier trees in the grove. It is estimated that the nematode is capable of moving 50 feet a year in any direction.

These barriers must be continually fumigated and deepened. The worm has been found as far down as 14 feet below the surface of the ground.

The second method of control means that a grower must pull and burn approximately 64 trees surrounding the infested tree, whether the other trees are healthy or not. Then the land must be fumigated and new trees planted.

Science News Letter, October 2, 1954

GENERAL SCIENCE

Nation's Research And Development

► THE NATION'S military research and development program, together with the portions of the atomic energy program related to military use, now constitutes about half the research and development effort of the country.

Donald A. Quarles, assistant secretary of defense for research and development, in making this estimate explained that the support provided by Congress for new weapons development and other investigations for military purposes is about \$1,200,000,000. This continues the peak Korean war level for this purpose.

Science News Letter, October 2, 1954

PHYSICS

Bat's Percussion Center

► AN INVISIBLE point inside some player's baseball bat may decide the winner of the 1954 World Series. The center of percussion, as this spot is called, may have been responsible for a historic homer during the 1951 pennant playoffs in the National League.

Remember when, in the last half of the ninth with the Brooklyn Dodgers leading 4-2, Bobby Thomson stepped up to bat for the New York Giants with two men on base? Remember his homer into the upper deck of the left-field stands? Remember the three Giant runs that came in while a bug-eyed crowd went wild?

It is likely that Thomson smacked the ball right on his bat's center of percussion.

This is the spot where the most energy in the batter's swing is transferred to the ball, Dr. Lyman J. Briggs, director emeritus of the National Bureau of Standards, told SCIENCE SERVICE. It is a theoretical point inside the bat and is a few inches from the bat's end.

Players can tell when they sock the ball on the center of percussion. The hit feels "solid," and the bat does not sting.

A ball struck at the center of percussion goes farther than if hit closer to the batter's hands or nearer the bat's end. Maybe the

added distance would put it over the fence.

If a ball is not hit on the center of percussion, the bat tries to spin around this point. It tries to wrest itself from the player's grip—and that is why the bat sometimes stings.

In terms of home runs, this may mean the difference between victory and defeat. For when the bat stings the player's hands, not all of the bat's energy is going into the ball. Some of it is wasted in trying to twist the bat.

The center of percussion may not be the same for two bats. The size, shape and weight distribution of the bat determines the location of this invisible point.

The physicist will tell you that: $L=1/mr$, and this is the formula that locates the point of percussion.

However, before you can figure the distance (L) from the bat's handle to the center of percussion, you must calculate the inertia of the bat (I) and weigh the bat to get its mass (m) and balance the bat to find the distance (r) from the handle to its center of gravity.

Dr. Briggs suggests that it may be easier just to take a few swipes at the ball until you can hit it without stinging your hands.

Science News Letter, October 2, 1954

PUBLIC HEALTH

Hunters Guard Against Tularemia

► TULAREMIA, OR rabbit fever, is one of the dangers that threaten hunters. The germs of this disease are not limited to rabbits. They have been found in other small wild animals from mice to opossums, squirrels, coyotes and skunks.

The disease can be contracted from handling an animal sick with it and from the bite of ticks, fleas and lice that have fed on infected animals. Eating improperly cooked meat from infected animals or drinking contaminated water have also been blamed for the disease.

Hunters and trappers are not the only ones exposed to this danger. Butchers and housewives who skin and clean infected rabbits can get the disease. The germs can go through little cuts or scratches on arms and hands and can even penetrate unbroken skin.

The wise thing is to wear gloves when handling the animals. If blood splatters above the gloves, wash it off quickly.

The sickness starts within three to five days after the germs get into the body. Headache, chills and fever are the first signs. Weakness, loss of weight, prostration, backache, joint pains and drenching sweats mark the acute stage, which lasts two or three weeks, after which the fever drops gradually.

The fever is always high, 104 or 105 degrees Fahrenheit. Because of the weakening effect of the disease, convalescence usually takes two to three months.

Even though modern medicines may get the patient well faster, an attack of rabbit fever is a pretty mean kind of sickness. The wise hunter will be alert to the danger and if he should get sick will call his doctor.

Science News Letter, October 2, 1954

CHEMISTRY

Fight Tropical Pests

► TROPICAL AGRICULTURE is being eyed by chemists as offering potential markets for pesticides and weed control chemicals.

Weeds, diseases, insects, rats and bacteria take their toll of crops in the warmer regions of the earth.

Coffee alone is ravaged by more than 60 diseases. Sugar, cacao, rice, bananas and citrus fruit are export crops from the tropics, just as are cotton and rubber, and each has its share of trouble that chemicals could help.

Better yields of food crops are necessary for better living conditions in many parts of the world, experts on population agree. Cutting down the waste that is now consumed by pests would go far toward giving the human inhabitants of backward countries a better food supply.

Many chemicals have been developed to combat the enemies that plague farmers in temperate zones. None of them is without some drawback, but together they offer a wide choice of methods of attack.

For tropical conditions these methods must be reviewed to see which can be carried over and which, for one reason or another, cannot be used.

Some are too expensive in the quantities needed. Some need to be formulated with adhesives to keep them on the plants dur-

ing the rainy season. Some find opposition from local farmers, due to custom, religion or superstition. Some farmers never get a chance to learn about the helpful discoveries they would be glad to use.

These problems were discussed at the meeting of the American Chemical Society in New York by chemists from the tropical Americas, taking part, with others, in a symposium on use of pesticides in tropical agriculture. Dr. Norward C. Thornton, United Fruit Co., presided at the session.

Dr. John S. Niederhauser and Dr. Douglas Barnes of the Rockefeller Foundation reported on the use of pesticides on basic food crops in the tropics. They concluded that, as knowledge of the control of insect pests and diseases in the tropics is increased, "it will be possible not only to lengthen the growing season of basic food crops, but almost certainly to diversify the crops."

"These two steps will create a more stable agricultural economy and give stimulus to agricultural progress," they think.

Factors influencing the demand for pesticides in tropical agriculture were reviewed by Dr. Edson J. Hamblen of the U.S. Department of Agriculture. Special problems of particular crops were presented by scientists from the tropical countries where these are grown.

Science News Letter, October 2, 1954

HOW TO TRAVEL

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There's a job waiting for you somewhere—on a ship, with an airline, in overseas branches of American firms, in foreign firms overseas—even exploring if you're adventurous.

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☛ **SILICONE SOLUTION** and film holder permit amateur photographers to fix most scratches on prized 35mm negatives. Washed over the film while in the special holder, the silicone solution fills the scratches so they do not show. The solution wipes off quickly after the enlargement is made. Solution and holder are to be marketed in the next few months.

Science News Letter, October 2, 1954

☛ **NEW UNDERCOAT** paint dries in 30 minutes after priming and sealing the surface. The undercoat does not require special mixers or thinners, and dries smooth and even. A soft eggshell white, it can be tinted with water-dispersed colors.

Science News Letter, October 2, 1954

☛ **DISC RECORDER** uses a plastic record covered with iron oxide to take down music from radio or television, or to record Junior's first words. The "erasable" recording disc can be reused at least 10,000 times. A plug-in phonograph cartridge and adapter button convert the machine into a standard 45 rpm record player.

Science News Letter, October 2, 1954

☛ **DECOY DUCKS**, made of a butyrate plastic, are molded in life-like detail and



are sprayed with long-wearing lacquers in colors appropriate to breed and sex. Factory weighted to give a realistic swimming action, the ducks can be anchored in place to attract pintails and mallards, as shown in the photograph.

Science News Letter, October 2, 1954

☛ **TEETH PROTECTOR** for high-school football teams eliminates the expense of custom-made, individually-fitted mouth guards. The rubber-like blank is heated in water for 90 seconds, then clamped in the mouth of its user for five minutes and chilled with ice water. The resulting protector snugly fits the boy's teeth to distribute the shock of heavy blows over several teeth.

Science News Letter, October 2, 1954

☛ **RUBBER FLOOR** tiles have an adhesive already applied to their backs. Protected by a strip-off plastic sheet, the adhesive adheres firmly to floors swabbed with a solvent. Each tile's adhesive bonds to the other's to yield a waterproof barrier.

Science News Letter, October 2, 1954

☛ **WORKBENCH KIT** for the do-it-yourself handyman consists of a pair of steel legs, back supports, a steel drawer and assorted bolts and screws. The length of the workbench can be varied, depending upon the length of lumber bought for the workbench frame. The lumber is not included in the kit.

Science News Letter, October 2, 1954

☛ **DESSERT DISHES**, previously distributed only to commercial users, now permit the housewife to serve professional-looking banana splits, sundaes or strawberry shortcakes. The rugged plastic servers are red, yellow, green or blue and double as refrigerator dishes when not needed at the dinner table.

Science News Letter, October 2, 1954

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Do You Know?

A disabling injury strikes some person in America every 26 seconds.

About 85% of Greenland's 736,000 square miles is covered with a permanent icecap.

Polluted air may damage health, forests and crops, and even buildings.

The snapping turtle never feeds out of water because it cannot swallow unless its head is submerged.

Almost every 10 minutes, someone thinks up a new product or improvement for which a patent is issued.

Publication of a climatic handbook to include weather records in well-distributed locations all over the world has been proposed.